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ABSTRACT

This paper outlines several properties of internal representational models (IRMs) and offers terminology that may help to differentiate the models. Properties of IRMs include focus, memory systems, content, cognitive function, "metastructure," quality of attachment, behavioral strategies, and attitude toward attachment. An IRM focuses on the person whose attachment behavior is described by the model. Memory systems, such as procedural, semantic, and episodic memory, contain different types of encoded and retrieved information relevant to attachment. The content of an IRM consists of what the individual knows about a particular relationship. IRMs help individuals interpret the meaning of others' behavior and make predictions about others' behavior. IRMs can facilitate the organization of a response. "Metastructure" refers to the cognitive organization of the IRMs of two or more attachment relationships. Quality of attachment refers to individuals' expectations of their attachment figures and of themselves based on experiences with the attachment partner. Behavioral strategies are individuals' typical behavioral responses to attachment figures. Directions for further study are suggested. Nearly 50 references are cited. (RH)

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Internal Representational Models of Attachment Relationships

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A major focus of recent work in attachment theory has been internal representational models. Investigators have both explored the nature of the models themselves and expanded their application to ages beyond infancy. In the process of this expansion, we have moved in a variety of directions while sometimes lacking the concepts and terminology to differentiate those directions. For example, both Main and I have identified patterns of internal representational models in adulthood (Crittenden, 1985; Main, Kaplan, & Cassidy, 1985). Our patterns, however, do not closely resemble one another. I respect Main's work greatly and find her adult patterns coherent, sensible, and useful. I also think my own work is credible. Why, therefore, aren't our models for adults similar? I've been pondering this since our 1985 publications outlined our different models for adults. I've come to the conclusion that the reason for the difference is not simply that we had different types of samples, i.e., middle-class, normative versus low income, maltreating, or that we used different procedures; the difference is primarily that we were assessing different things with insufficiently precise theory and language to articulate the differences.

A second example may further substantiate the existence of a problem. Bowlby has expressed concern that I and many of my American colleagues are using the term "working model" in an unconventional and confusing manner (personal communication, July 1988). We have been using "working model" to mean a model open to new information. Bowlby had used the term "open" to describe that notion and the term "working" to refer to the notion of cognitive manipulation of alternative behavioral strategies. Thus, an internal representational model could be both open and working, or neither, or one and not the other. This made immense sense in terms of the models

which I had described for maltreating mothers because these models appeared to represent all four possible combinations of working/non-working and open/closed models. Moreover, the conceptual clarity implied by the terms was meaningful to the experience, situation, and treatment of troubled adults and their children.

These two examples were the impetus to my attempting in this paper to elaborate those aspects of internal representational models with which we were dealing. Tied to that, of course, was the importance of clear and accepted terminology to describe our concepts. As a first step, I would like to outline here several properties of internal representational models which I believe to be distinct and to offer some terminology which may help to differentiate them. I will not attempt to develop the historical context for the ideas presented as others have already done this (Bretherton, in press; Pipp, in press), nor will I attempt to summarize the recent research except as it relates to the characteristics of internal representational models. I will conclude by suggesting some areas for further investigation.

Models of Attachment Relationships

An attachment relationship is a very specific type of relationship consisting of an affectional bond, to a specific individual, which endures over time and distance and which has a survival function (Ainsworth, Blehar, Waters, & Wall 1978). Internal representational models of attachment relationships are discussed here as constructs to describe the presumed cognitive basis underlying consistencies in both species and individual behavior with reference to attachment figures. Dyads with an attachment relationship may also have other types of relationship, e.g., sexual, recreational. Although models of these aspects of relationship may be presumed in the same sense that there are models of attachment relationships, the discussion to follow refers specifically to models of

attachment relationships.

Properties of Internal Representational Models

Focus

The focus of an internal representational model is the person whose attachment behavior is described by the model. This person can be characterized in several ways including relation to the self, role in the attachment relationship, and relation to the other's role. Because individuals may hold several models concurrently, it is necessary to identify the focus of each.

Self/Other. Bowlby states that an individual forms two representational models for each relationship: one of the self and one of the other person in the relationship (Bowlby, 1980). For instance, the models which I outlined for abused children identified the self as unworthy of love and responsible for problems with the attachment figure and the attachment figure as demanding, rejecting, and angry (Crittenden, 1988a). Similar pairs of models were described for neglected, abused-and-neglected, marginally maltreated, and adequately reared children. Most studies of child-parent attachment presume the existence of both models although their presentation is often blended as though there were only one model.

Attachment figure/Attached person. The model of the self may be as an attachment figure or as the attached person. Several research groups are exploring mothers as caregivers (Bretherton, Biringen, Ridgeway, Maisin, & Sherman, in press; George & Solomon, in press); George and Solomon are particularly careful to differentiate between mothers' models of their attachment figures, mothers' models of themselves as attachment figures (caregivers), mothers' models of their children, and children's models of their mothers as attachment figures. Likewise the model of the other may

refer to either role. This discussion will use the term "attachment partner" to refer to either member of an attachment relationship where the specific roles of attachment figure or attached person are unknown or not pertinent to the point being made.

Complementary/Reciprocal. The relationship (and model) may refer to a complementary relationship such as most parent-child relationships where one person is the attachment figure to the other who is the attached person. On the other hand, the relationship may be reciprocal where each person is both an attachment figure for the other and attached to the other. Marital relationships are an example of reciprocal relationships.

Memory Systems

Memory systems refer to types of information which are encoded in, and retrieved from, memory. Bowlby, referring to Tulving (1979), described two memory systems, i.e., episodic and semantic, relevant to attachment (Bowlby, 1980). Tulving has since outlined a third system, procedural memory, and suggested that there are almost certainly additional memory systems (Tulving, 1985). Because few studies focus on additional memory systems, I will explore only the relation of these three memory systems and their associated encoding and retrieval processes to internal representational models of attachment.

Procedural memory. Procedural memory consists of patterns of behavior which are consistently elicited by specific situations. For example, an infant, upon hearing his mother's approach, usually turns to greet her with a smile. Such patterns indicate a behavioral generalization based on repeated sequences of interaction with the attachment figure.

The openness of these models to situation-specific information is unclear. Some see such models, identified variously as scripts, "representations of interactions that have been generalized" (RIGs), and

generalized event structures, as highly reflective of the unique characteristics of the situation at hand (Bretherton, 1987; Pipp, in press; Stern, 1985). As used by Tulving (1985), however, the term procedural memory does not imply greater sensitivity to the unique aspects of actual interactive sequences than later developing, linguistically encoded memory. On the contrary, the preconscious nature of these models suggests their robustness in the face of contradictory information. According to Tulving, the majority of our behavior consists of such familiar behavior routines which are enacted without conscious thought. These procedures are encoded behaviorally and can be thought of as analogs to sensorimotor schemes (Bruner, Olver, & Greenfield, 1966; Piaget, 1952).

Behavior shown by infants in the Strange Situation can be thought of as reflecting procedural knowledge. The consistency of such behavior suggests the nature of the underlying internal representational model. The representational model, then, should be considered a model based on procedural memory. It is preconscious and reflective of the infant's actual experience although the actual experiences themselves are not remembered. Moreover, it will continue to influence behavior even after more sophisticated and conscious memory systems develop.

Semantic memory. Semantic memory is thought to consist of impersonal, undated, world-relevant facts (Tulving, 1989) which are encoded linguistically. In terms of attachment theory, semantic memory would contain generalizations about the nature of relationships, either specific relationships (one's mother) or types of relationships (the maternal role.) There are probably two sources of semantic memory, one consisting of information received from other people, e.g., what parents say to their children about the parent's behavior, the other consisting of the child's

own conclusions based on direct experience. In either case, the information is independent of memories about when, where, or how the information was acquired. There may be distortions in either type of information, but especially in the former. Semantic memory is conscious and is displayed verbally.

Episodic memory. Episodic memory consists of situation-specific, personal memories stored with temporal information and remembered sequentially as anecdotes or vignettes. This memory system first develops in early childhood; memories in it are encoded visually or linguistically. Episodic memory can be available to conscious review and appears to be more readily revised as a result of new information or perspectives than procedural memory.

The development of memory systems. These three memory systems can be considered developmental in that they appear in a predictable age-related sequence (Tulving, 1985, 1989) and that there is development within each system (Pipp, in press). Procedural memory almost certainly develops first because it is evident in patterned behavior in the first months of life (Rovee-Collier & Fagan, 1981; Sroufe & Wunsch, 1972). In addition, it is the least sophisticated and most universal of memory systems. It is not, however, limited to infancy; throughout life most behavior results from procedural memory and new event patterns are encoded to procedural memory. Semantic memory is not evident until after the development of representation. (See Bretherton, 1984 for a review of these notions.) It contains less detail and requires less sophisticated processing than episodic memory because only the information itself need be stored. Episodic memory, on the other hand, includes not only the basic content information but also memory of the self as a participant, the sequence of events in the episode, and the temporal placement of the episode relative

to other episodes in the person's life. Few episodic memories have been reported in children less than five years old (Fivush & Slackman, 1986).

Further evidence of the ordering of the development of the semantic and episodic memory systems is drawn from observations of brain-injured subjects with amnesia (Tulving, 1989). In all cases where episodic memory remains, semantic memory is also functional. The reverse, however, is not true suggesting that episodic memory is dependent upon the functioning of semantic memory. This finding suggests a physiological relation between semantic and episodic memory. The observations of psychotherapists that some individuals can recall only generalizations about their past and not actual experiences suggests a parallel psychological relation. In both cases, semantic memory appears to function as a gate-keeper to episodic memory. The pattern of increasing complexity suggests an order to the development of these three memory systems. Concurrent with the development of new memory systems must be the development of procedures for communication across the systems (Erdelyi, 1985). Both the ordering and the relations among systems need additional empirical evidence.

Distortions of memory and models. Memories in any system may have distortions. These distortions may occur either in the encoding process or the retrieval process (Tulving, 1989). Distortions in encoding have been discussed by Bowlby (1980) in terms of perceptual exclusion. Some perceptual exclusion reflects merely the relative salience of various aspects of the event; in other cases, a systematic bias is hypothesized to operate such that certain classes of information, such as signals of attachment or feelings associated with attachment experiences, are excluded from perception. Distortions which occur after perception include those in which the person actively creates in memory, by deletion or distortion,

aspects of wish fulfillment or unrealized expectations. Further, memories can be elaborated, corrected, or distorted by what one experiences, is told, or reconsiders later. In any case, the memory distorts reality. To the extent that memories are systematically distorted, it is probable that the internal representational model derived from them will also be distorted.

Distortions in retrieval reflect the inability to recall information which is in fact stored. The discussion above of the gate-keeping role of semantic memory suggests that the internal representational model associated with semantic memory may contain rules or guidelines regarding access to other memory systems (George & Solomon, in press). This suggests that distortions or restrictions to the process of communication between memory systems may result in further distortions to models. (See Bretherton, in press, for further discussion of this issue.)

The notion of distorted models or relations between models, however, should be differentiated from that of accurate models reflecting a distorted reality. Maltreated children, whose experience is highly deviant, may develop models portraying relationships as power struggles or as devoid of feeling. In either case, the child would not have a "distorted model" but rather an accurate model of a distorted reality. Such models only become distorted if they are applied without modification to a more normative reality. The difference, then, is between a distorted model which does not accurately reflect experience and an accurate model of a distorted relationship.

Coordination across systems. Individuals appear to differ in the extent to which they can co-ordinate different memory systems. Because, from a theoretical perspective, the content of each memory system may be different, different models of a relationship probably exist for each

memory system. Individuals may have conscious access to all or only some of these memory systems. Furthermore, individuals probably vary in their ability, willingness, and interest in comparing procedural, semantic, and episodic memories and the associated internal representational models.

It is not clear which model or models are most directly involved in interactions with the environment, i.e., perception, interpretation, and formulation of a response. Because only procedural models are operative in infancy and because procedural models offer an efficient response system, it is possible that most incoming information is handled exclusively by procedural memory. In such a case, it might be supposed that ambiguous or highly discrepant information would be needed to activate higher memory systems. This would suggest that most information is not interpreted in co-ordination with multiple models and that most behavior is controlled by procedural models alone. It does not explain, however, how semantic memory generalizes information from these experiences or how experiences are encoded to episodic memory although both processes quite obviously occur.

The ability to integrate information from different memory systems may have important implications for adjustment and treatment (Bowlby, 1973, 1980; Bretherton, in press). In both cases, semantic memory may have a particularly important role in access to and interpretation of multiple memory systems. This role may consist of guides to the importance or handling of specific kinds of information. These might include prohibitions acquired from others regarding access to certain types of memories or the individual's own cognitive procedures for avoiding uncomfortable or painful situations (Bowlby, 1973, 1980.)

Where the content of models from different memory systems is consistent, it may be quite easy to integrate them. On the other hand,

their similarity may make it difficult to determine which model is operative in any specific situation. Where the models are discrepant, the process of integration may be more readily assessed. In either case, where integration of discrepant models across different memory systems does occur, it is unclear whether the integration changes one or more of the underlying models or whether it creates a new meta-model. The implications of this distinction need to be considered.

Content

The content of an internal representational model consists of what the individual knows about the relationship. There are two types of information, factual knowledge and affective knowledge. The factual and affective content for any given relationship may be different for models in different memory systems.

Factual knowledge about a relationship. Factual knowledge refers to the actual information a person has about his own or another's attachment behavior. For example, a child might know that his or her mother rarely responds to requests for help until the request is intensified to the level of a tantrum. Another child might know that the best way to get a response is show affection or nurturance to the attachment figure.

Affect. Affect refers to the feelings associated with the relationship. Such feelings can range from deep satisfaction and contentment to fear, rage, anxiety, and despair. These feelings seem to be inextricably joined to thoughts of, or activity with, the attachment partner. The relationship of affect to actual experience and to later behavior may, however, be unclear to the individuals experiencing the relationship. In such cases, dissociation or repression may occur leading to apparently inexplicable behavior. The nature of such defensive processes has been explored by the Grossmanns and their colleagues (Grossmann,

Grossmann, & Schwan, 1986) although considerable elaboration is needed.

Cognitive function

Internal representational models are postulated to assist individuals in two ways. First, such models can help an individual to interpret the meaning of others' behavior and to make predictions regarding others' future behavior. "Open" models are open to new interpretations and predictions. "Closed" models interpret all behavior in terms of the existing model. Second, such models can facilitate the organization of a response. "Working" models allow cognitive manipulation of possible responses. "Non-working" models do not allow cognitive exploration of behavioral alternatives. The responsiveness of the model to new information and the ability of individuals to use the model to organize their responses are relevant to the adaptiveness of the model.

To illustrate these points, I will describe four types of models shown by the mothers in my studies of maltreatment (See Table 1). Abusing mothers appeared to conceive of all attachment relationships, e.g., those with their parents, children, and spouses, as competitive power struggles. Their internal representational models of these relationships appeared not to be open to new or discrepant information; in that sense, the models were "closed." The mothers, however, were clearly able to behave differently and appropriately in different attachment relationships and different sessions. For example, a mother might be placating with her spouse and intimidating with her child. Later she might try to cajole her child into co-operation. She could, thus, be presumed to be able to consider, in advance of acting, a number of behavioral alternatives, to enact them in her mind, and to select the one most likely to yield the desired outcome in the specific situation at hand. Her model, in other words, was a "working" model.

Insert Table 1 about here.

Neglecting mothers appeared to have models of all attachment relationships as empty and ineffective. Because the model appeared uniform across relationships, it was a "closed" model. However, unlike abusing mothers who also had closed models, neglecting mothers tended to behave in the same manner in most situations; they withdrew even when other behavioral strategies would have been more advantageous. Thus, their models also appeared to be "non-working."

Marginally maltreating mothers, on the other hand, appeared to recognize the variety inherent in different relationships, but to be unable to evaluate mentally behavioral alternatives. Instead, they frantically responded with a barrage of strategies many of which were superseded by other strategies before their effect could even be evaluated. Such models can be described as "open," but "non-working."

Finally, adequate mothers provided an example of "open" and "working" models. Their models were specific to each relationship and their behavioral responses both were varied and appropriate to the situation at hand.

Meta-structure

Meta-structure consists of the cognitive organization of the internal representational models of two or more attachment relationships. Although at present we can only speculate about such organizations, there are both philosophical and pragmatic reasons for exploring them. From the perspective of theory, understanding the meta-structure will ease confusion resulting from dealing with models of several different attachment

relationships. This will facilitate the study of the nature and function of attachment and internal representational models in families. Pragmatically, we may be better able to understand and treat some types of emotional and behavioral disturbance if the nature of the underlying cognitive structure is understood.

The organization of meta-structures. Two issues are of particular interest with regard to meta-structure. First is the nature of the meta-structure itself, that is, the cognitive organization of the models. Based on the work of Bowlby (1980) and my own data on maltreating mothers, I have suggested three types of meta-structures (Crittenden, 1988a). Although these were developed from a maltreating sample, they have the advantage of providing a complete set of theoretically possible categories with empirical data relevant to each. A brief description of each follows.

In the simplest of the organizations, a single internal representational model can be applied to all relationships; in this case the unique characteristics of each specific relationship are distorted to fit the model. Piaget's notion of assimilation (Piaget, 1952) describes a process wherein all situations, regardless of their actual characteristics, are treated in the same manner. In the case of attachments, all would be assimilated into a single model of relationships. See Table 1 for the relation of functional characteristics of models to meta-structures.

Abusing mothers provide an example of perceiving new relationships in terms of past experiences. Based on past experiences, abusing mothers tend not to trust others and expect to be taken advantage of. Consequently, they respond with wariness and manipulativeness to new acquaintances. When the other person is deceptive or controlling, this interpretation is both accurate and adaptive. However, when the other person is more responsive, the tendency of abused people to perceive only negative behavior and/or to

interpret positive behavior negatively, leads to the distortion of reality and to their missing opportunities for more supportive relationships.

A more complex meta-structure which more closely reflects reality would consist of multiple, unrelated internal representational models (one for each relationship). Although this structure would permit acknowledgment of the uniqueness of each relationship, it would also tend to prevent individuals from developing a sense of coherency, particularly of the self, across relationships. (See Gustafson, 1986 for some of the implications of this condition). In Piaget's terms, the pattern is one of accommodation. For example, marginally maltreated mothers appear to have a variety of relationships (and corresponding internal representational models) but to be unable to predict anything in general about relationships. More important, they appear unable to predict their own behavior.

A generalized model with differentiated, relationship-specific submodels is both the most complex meta-structure and potentially the most accurate. Such a model can reflect consistency in the self and in one's experience while concurrently acknowledging the unique characteristics of specific relationships. For example, adequate mothers appear to expect most people to be co-operative and responsive without having to assume that all are so; they can acknowledge and respond differentially to the unique characteristics of each relationship including those that are very discrepant from their general expectation. In Piagetian terms, such models display both accommodation and assimilation.

The development of meta-structures. The second issue with regard to meta-structures is their development. Because development typically proceeds from simple to complex structures, it might be expected that the structures described above would develop in an ordered manner. The fact

that they appear to be related to individual differences in experiences and adaptation suggests an arresting of development for individuals with distorted and painful experiences. This notion is, of course, not new.

Information is needed regarding the structure developed at the time of the formation of the second attachment relationship. Because relationships are usually formed with both parents by the second year of life (Main & Weston, 1981; Schaffer & Emerson, 1964), a meta-structure is needed during the pre-linguistic sensorimotor period of cognitive development. Such a structure would presumedly be based only on procedural models. The finding of Main and Weston (1981) that children form independent relationships with their mothers and fathers by 18 months of age suggests that fairly complex meta-models (such as multiple models) may develop quite early, at least for children reared by reasonably responsive parents. If infants are likely to have more than one attachment figure and are unlikely to be capable of developing complex generalized models with differentiated sub-models, the process by which transformations of the meta-structure occurs becomes an important component of the understanding of internal representational models.

Quality of attachment

Quality of attachment refers to individuals' expectations of their attachment figures and of themselves based on actual experiences with the attachment partner (Ainsworth et al., 1978). Ainsworth has identified three qualities of attachment: secure, anxious (or insecure), and defended insecure. Although the two insecure qualities are most often described in terms of behavior shown in the Strange Situation, i.e., ambivalent and avoidant, in fact, the qualities receive their meaning from the extensive home observations carried out by Ainsworth and her colleagues (Ainsworth et al., 1978). The three terms offered here are those preferred by Ainsworth

because they reflect the overall pattern of the relationship more accurately than terms based on behavior in the Strange Situation (Ainsworth, personal communication, May 1989). Because extensive discussions of these patterns exist in the literature (cf. Crittenden & Ainsworth, 1989), they will not be presented here.

The patterns have been applied to ages beyond infancy. With the exception of the controlling pattern (Main, Kaplan, & Cassidy, 1985) and the avoidant/ambivalent pattern (Crittenden, 1985; Radke-Yarrow, Cummings, Kuczynski, & Chapman, 1985), little attention, however, has been focused on possible developmental change in the nature of individual differences in quality of attachment (rather than changes in the way the patterns are displayed). See Marvin (1977) for an example of a developmental change in the nature of attachment at older ages.

Behavioral strategies

Behavioral strategies are individuals' typical behavioral responses to attachment figures. The pattern of strategies chosen by a given individual may be expected to reflect 1) the representational models of the self and the attachment partner, 2) the developmental level and experience of the person, as well as 3) the characteristics of the specific situation. More than one strategy may be used; for example, a child who is avoidant in the Strange Situation may be demanding at home. Ainsworth has identified three major behavior strategies, i.e., approach, resistance, avoidance, used by infants in the Strange Situation during reunion with their attachment figures. Main has added a fourth, control, which she observed in older children following a brief separation from their attachment figure.

In addition, different contexts require different behavioral strategies. Crittenden has identified several strategies, i.e.,

cooperation, difficultness, compliance, passivity, used by children in play interactions with their attachment figures (Crittenden, 1981, 1985, 1988a). Several adult strategies, e.g., sensitivity, covert and overt hostility, and withdraval, were also described. In addition, both Crittenden and Radke-Yarrow have shown that children and adults can use combinations of strategies, i.e., resistance and avoidance, hostility and withdrawal (Crittenden, 1985; Radke-Yarrow, et al., 1985).

Behavioral strategies reflect internal representational models in that they are selected by individuals on the basis of expectations of themselves and their attachment figures in the specific context at hand. They also reflect developmental change with older children having the possibility of a wider range of more sophisticated strategies.

A strategy may typify a specific type of model under specific circumstances. For example, the procedural internal representational model of infants who have experienced rejection by their attachment figure is associated with the use of an avoidant behavior strategy in a reunion with the attachment figures following a brief separation. Nevertheless, other strategies will be used by "avoidant" children in other circumstances. Furthermore, children with very different procedural models will use avoidant behavioral strategies in some circumstances. The function and pervasiveness of the strategy are essential to understanding its relation to the internal representational model.

Attitude toward Attachment

Attitude toward attachment refers to the individual's understanding of the importance of attachments. Main and her colleagues have used an adult's ability to access both episodic and semantic memory and to integrate factual and affective information from both memory systems as partial indicators of a person's "state of mind with regard to attachment."

The status of this concept as an attribute of a specific memory system (or internal representational model), or of a set of memory systems, or as a meta-model is at present unclear.

Although Main does not explore definitively the notion of attitude toward attachment through the Adult Attachment Interview (George, Kaplan, & Main, 1984), she explores many aspects of it and provides the basis for a categorization of attitudes toward attachment (Main & Goldwyn, 1988). The classificatory system represents a direct attempt to extend the categories of the infant system to adulthood: infant avoidance is associated with the adult dismissing category, infant ambivalence with the adult preoccupied category, and infant security with the adult free/autonomous category. Although Main uses the terms "free" and "autonomous" to describe the desirable midpoint between dismissing and preoccupied, I would suggest the term "balanced." Free and autonomous carry the connotation of being independent of others, whereas the intended meaning is that of balancing one's need for, and attention to, an attachment partner with independent interest and involvement with other activities. (See other papers in this volume for a fuller discussion of the categories).

Assessing attitude toward attachment. The assessment of state of mind with regard to attachment is being broadly applied and frequently validated (Ainsworth & Eichberg, in press; Kobak & Sceery, 1988). It is not, however, without problems, problems which bear discussion because they highlight problems in the body of attachment research as a whole. A comparison of Main's categories and those of the Grossmann group in West Germany suggests some of the issues and difficult choices to be made. Both groups used the Adult Attachment Interview to assess maternal representations of attachment and the Ainsworth Strange Situation to assess infant attachment to the

mother. Both sought a relation between mothers' representations of attachment and infants' attachment to the mother. The groups differed in the procedures used to score and categorize maternal patterns.

Main's procedures consist of rating scales used to assess aspects of subjects' childhoods and of their current state of mind with regard to attachment. In addition, scales for fear of loss, passivity of thought, and derogation are important for classification. A final scale, coherency of mind, is used to rate the transcript overall. Scores from these rating scales are used to classify the subject's state of mind with regard to attachment.

Although the rating procedure and the table indicating the relation between rating scores and classifications (Main & Goldwyn, 1988, pp.134-5) appear objective, in fact there are a number of problems. Rather than being independent, the ratings are best conceived of as a guide to assure complete consideration of the relevant aspects of the transcript; once completed, the rater moves back and forth between the transcript, ratings, and categories adjusting as necessary to achieve a fit. Moreover, the scales include material related to the content of the interview as well as the manner of discourse; because firm guides for the rater have not been developed, the rater is dependent upon very extensive training of a clinical nature to be able to rate and classify the tapes.

On the other hand, more objective and quantitative systems such as that developed by the Grossmanns and their colleagues suffer from other problems (Grossmann, Fremmer-Bombik, Rudolf, & Grossmann, 1988). The Grossmanns' system is distinctly more objective and quantitative, thus, resulting in more certain rating scores, definitive category scores, and empirically sound results.

The more objective rating procedure, however, is obtained at a cost;

the Grossmann system focuses far more on historical events than on the subjects' integration of their experiences. The focus on events precludes balanced mothers with troubled childhoods from achieving the most secure classification, a possibility held open in the Main system. Such a scoring procedure is methodologically more defensible but possibly at the cost of discriminatory validity. The adult form of the anxious (ambivalent) infant pattern, the adult preoccupied pattern, is lost with only the defended (devaluing) and secure (valuing) patterns remaining. The richness of the Main subcategories is also lost; the Grossmann system, while validating the overall relation between infant security/anxiety and adult valuing/devaluing of attachment, seems spare and clinically far less appealing than the Main system. This loss of richness leads to a loss of hypotheses to be generated from using the system.

Indeed, that may be one of the major benefits of Main's approach. For her, hypotheses regarding loss (or trauma) are paramount; the system emphasizes their importance. Other investigators using other samples may highlight the importance of other antecedents, outcomes, or aspects of attachment and representational models. Given the nature of the existing system, it is possible for new categories to be added. A process that generates new hypotheses combined with empirical research more like the Grossmanns' which tests the hypotheses could further the field immensely. The risk, however, is that the present intense use of Main's procedures will function to freeze the system in its present form among attachment theorists while engendering criticism from others because of its methodological limitations and relatively narrow development sample.

Quality of attachment, behavioral strategies, and attitude toward attachment. According to the line of thinking outlined above, the notions

of quality of attachment, behavioral strategies, and attitude toward attachment are related but not identical. A woman who is anxiously attached to her unsupportive mother may use a variety of strategies to cope with the relationship (ranging from those developed in childhood to those first explored in adulthood). In spite of being unable to change her mother's unresponsiveness and unavailability, she may have developed a balanced attitude toward attachment in which she acknowledges its importance without either becoming preoccupied with changing her mother or denying the importance of that and other relationships. She, therefore, has an anxious quality of attachment to her mother, uses a variety of behavioral strategies, and maintains a balanced attitude toward attachments.

Although such distinctions seem relatively clear, pushed further the need for additional theory and research is highlighted. Using the example in the previous paragraph, let us assume that the woman is currently in anxious relationships with both her husband and child. She is, however, aware that she uses shifts of attention to cover her hurt feelings and that she often appears to rebuff her child while engaged in her own activities. She recognizes her child's pain and feels empathic. She notes, ruefully, that much as she tries to change, old habits are strong. Given her articulateness, insight, and humor, she appears balanced although all of her relationships are anxious. Such an example raises two questions. First, could this occur in reality? Second, if so, is it possible that a person who experiences only anxious attachments can be balanced in attitude toward attachment?

Summary

Some of the notions which I have presented are fairly straight forward and unlikely to cause misunderstanding or disagreement; they merely

needed to be stated. For example, the discussion of focus of attachment. Others push the limits of current research and can only be sketched, e.g., memory systems, meta-structures. Others require a rethinking of familiar ground, e.g., working and open models. The discussions of quality of attachment, behavioral strategies, and attitude toward attachment are particularly thorny.

I have outlined what I consider to be some important properties of internal representational models and have offered some terminology to identify them. I do not, however, suffer under the delusion that these properties or terms are either definitive or the most suitable. Instead, I would like these notions to serve as the basis for further refinement in our thinking about internal representational models. Concurrently, I recognize that distinctions which I am suggesting raise many more questions than they resolve.

Directions for Further Inquiry

Theory

Clarify concepts and terminology. As a matter of "housekeeping", it is necessary that further theoretical papers explore internal representational models in ways that clarify the meaning of concepts. At a minimum, this will entail the judicious use of a common lexicon of terms. These must be clear, agreed upon, and yet not so overburdened with nuances of meaning that others cannot understand and use them. That is, they must facilitate communication among investigators rather that defining denominations of believers. The discussion above has a) used familiar terms in traditional ways, e.g., episodic and semantic memory, b) used familiar terms in unfamiliar ways, e.g., working model, open model, c) substituted unfamiliar terms for those more commonly used, e.g., defended insecure versus

anxious/avoidant, balanced versus free/autonomous, and d) offered a few new terms, e.g., procedural memory, attachment partner. Attention should be paid to the determination of which concepts are necessary and which terms best express them.

Conceptualize attachment developmentally. Major changes in familial and social relationships occur across the life-span (Ainsworth, 1989). These changes are likely to affect both the nature of attachment and the display of attachment behavior. For each age or stage we should reconceptualize the interplay of behavioral systems most relevant to attachment. Attention should be paid to the possibility that, although the biological function of attachment remains constant, at ages beyond infancy attachment may become associated with other culturally derived needs. This may lead to a changing pattern of behavioral systems which interact with the attachment system.

Expand the range of subjects. The great majority of studies using an attachment paradigm have included only middle income American subjects. Even when non-American subjects are studied, the children tend to be advantaged members of technological societies. Such children are, from an evolutionary and population perspective, atypical of human children. In the United States an effort should be made to study low income American children who, as a proportion of the population, are both more normative and more ethnically diverse than middle class children. In addition, information on attachment in non-Western societies should be sought. In both cases, however, such studies should be careful not to use a deficit model based on middle class norms from which to interpret the results.

Relation of attachment to other aspects of a relationship. Many theories have hypothesized that infants' relationships with their mothers affect the nature of other relationships. Bowlby's notion of internal

representational models outlines both a mechanism for this influence and suggests some limits to the influence. The notion that the attachment component of a relationship is not synonymous with the entire relationship is an important contribution to theory (Ainsworth, in press). Researchers should explore further the relation of the attachment aspect of internal representational models of a relationship to other aspects of the relationship, e.g., play, teaching, caregiving, sexual, and economic. (See Grossmann & Grossmann, in press, for a discussion of this point.)

Non-attachment relationships. Similarly, it is important to explore how the representational model of an attachment relationship is related to other types of (non-attachment) relationships, e.g., friendships, professional and business relationships. In addition, it would be helpful to know the extent to which all intimate and/or love relationships include an attachment component. (See Crittenden, 1985, 1988b; and Dozier, 1988 for discussions of the relation of models of attachment to interaction with professionals and therapists.)

Integration of disciplines. It should be clear that attachment research is coming to depend increasingly on theory, information, and methodology from other areas of study. At a minimum these include cognitive psychology, neuropsychology, linguistics, clinical psychology, and psychiatry. Efforts should be made to establish a wide range of collaborative projects which integrate attachment theory with work in these and other areas. In doing so, investigators will be following the lead of Bowlby who developed attachment theory from an integration of psychodynamic, ethological, and cognitive theory.

Assessment

Until recently, the Strange Situation was the only assessment of

attachment in wide usage. As more assessments are developed, it becomes important to differentiate assessments which tap developmental change from those oriented toward the identification of individual differences. Because most assessments of attachment being developed currently are based on the Strange Situation as a prototype, the focus on individual differences, and particularly coherency of individual differences across time, has predominated.

The influence of the Strange Situation is also seen in the procedures used to assess individual differences in quality of attachment at later ages, e.g., the three-four year Strange Situation (Cassidy & Marvin, 1989), the six year reunion procedure (Main, Kaplan, & Cassidy, 1985). Others, e.g., the Adult Attachment Interview (Main & Goldwyn, 1988), the family drawing procedure (Kaplan & Main, in preparation), use different procedures, but seek to identify similar qualitative categories. Investigators, however, are not always clear about exactly what specific procedures assess, e.g., models based on different memory systems, quality of attachment, behavioral strategy, etc. Future descriptions of assessment procedures should indicate what is being assessed as well as providing evidence validating the selected constructs.

Few assessments have been used primarily to explore developmental change (cf. Marvin & Greenberg, 1982; Greenberg, Siegel, & Leitch, 1983). Such assessments should develop from the salient conditions for activating the behavioral systems relevant to attachment at specific ages. In infancy the balance between physical safety and exploration is the critical component of attachment; consequently, separation in a novel and interesting situation activates the appropriate systems of behavior. Marvin's notion of assessing the development of goal-corrected partnerships at 3-4 years is an excellent example of identifying and using the salient

aspects of developmental change at an older age (Marvin, 1977). At later ages the situations which elicit attachment behavior may again change. This should be reflected in assessment procedures.

Finally, new procedures should be developed with specific aspects of internal representational models in mind. The failure to specify this was less noticeable with assessment of infants because infants have only procedural memory with models of the self and attachment figures in complementary roles. As individuals develop other relationships, levels of memory, and roles, it becomes necessary for assessment procedures to specify exactly what is being assessed.

Intervention

Attachment theory developed initially from a clinical tradition; both Bowlby and Ainsworth were clinicians and the early research was the direct result of clinical observations and used clinical samples. It is surprising, then, that current research has been almost entirely based on normative populations and issues. Although the volume by Belsky and Nezvorsky (1988) represents an important exception, far more work is needed. See work by Cicchetti, Toth, & Bush, (1988) Crittenden, (1988b), and Lieberman (1985) for other exceptions. Because the emphasis has been almost exclusively on infants, a life-span approach is now needed. Particularly with the present interest in internal representational models, the time may be ripe to consider the implications of attachment theory for treatment as well as to use special populations to extend the limits of the theory itself.

Two topics seem most in need of elaboration: 1) the relation of the development of internal representational models to treatment of children of different ages and 2) determination of the model(s) with which to

intervene. With reference to developmental effects, it will be important to understand both the nature of distortion in a child's experience and internal representational models and also the development of the child's memory systems and meta-structures. The importance to children of different ages of the various properties of internal representational models, e.g., focus, content, etc., needs to be considered; some may affect outcomes and/or adjustment more than others at different ages. For example, distortions in the early development of semantic models may have more detrimental effects than distortions occurring later. Similarly, distortions of semantic models which reflect a more normative experience than the child has actually had may facilitate treatment whereas models whose content prohibits examination of experience may hamper treatment.

With reference to selecting model(s) for intervention, research is needed which examines the effects of using treatment strategies focused on specific models and memory systems. Existing treatments can be reinterpreted in terms of a focus on memory systems and representational models. For the purpose of this discussion, approaches will be defined very narrowly to highlight differences. From this perspective, behavioral interventions can be viewed as focused primarily on procedural models and change in overt behavior. Cognitive therapies can be viewed as focusing on the content of semantic models and reconstruction of the models to permit more adaptive behavior. Finally, psychodynamic therapies emphasize episodic models with the intent of making conscious previously unavailable memories and using those to revise semantic models. (See Stern-Bruschweiler & Stern, in press, for a similar discussion). Similarly, existing treatments can be identified in terms of their focus on relationships (self only, both self and other) and aspects of relationships (attachment, sexual, recreational, etc.)

Using representational models as a unifying construct, it seems probable that changes to models from all memory systems will be needed for therapeutic change to become stable. Research is needed, however, to identify the ordering of intervention strategies: should all models be modified concurrently, should the process be sequential and, if so, is there a preferred order, and will therapeutic emphasis on specific memory systems lead to self-generated changes in other systems, thus making the process of treatment more efficient? In addition, it will be important to decide how to handle models of different aspects of a given relationship and models of different relationships. (See Marvin & Stewart, in press, for a discussion of the relation between attachment theory and family systems theory and treatment.)

At first, these questions appear to inject overwhelming complexity to the process of treatment. Although it is true that we will need to refine our thinking to respond to them, doing so will result increased clarity about the process of treatment. If, in addition, research about these issues proceeds together with research on basic developmental issues, the contributions of each to the other could greatly facilitate both theory development and practical applications.

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Table 1

Cognitive functions of internal representational models

	Interpretation and Prediction of Others' Behavior	
Organization of a Response	OPEN to new information	CLOSED to new information
WORKING (Cognitive exploration of possible responses)	OPEN/WORKING Model[1] Example: Adequate mothers	CLOSED/WORKING Model[2] Example: Abusing mothers
NON-WORKING (No cognitive exploration of possible responses)	OPEN/NON-WORKING Model[3] Example: Marginally maltreating mothers	CLOSED/NON-WORKING Model[2] Example: Neglectful mothers

[1] These characteristics of functioning suggest the potential for forming a meta-structure consisting of a generalized model with relationship-specific submodels.

[2] The closed characteristic of functioning suggests a single internal representational model for all relationships.

[3] These characteristics of functioning suggest a meta-structure consisting of multiple, unrelated internal representational models.